

## **Brooks Applied Labs Se Speciation Methods & QA/QC**

- Given the low mass of sample available and the requirement that any speciation be performed using a peer-reviewed method, we would recommend performing a sodium hydroxide leach (e.g., as discussed in the following paper: [ [HYPERLINK "https://doi.org/10.4319/lo.1984.29.6.1179" \t "\\_blank" \]](https://doi.org/10.4319/lo.1984.29.6.1179) ). But rather than use selective hydride generation to perform the speciation analysis, we would use the more modern technique of IC-ICP-CRC-MS to individually quantify the extracted selenium species.
- The approach described above would be operationally defined and could provide results for extractable Se(IV) and Se(VI). While this type of extraction has most commonly been applied only for the determination of Se(IV) and Se(VI), we could also provide results for specific organoselenium species (e.g., extractable selenomethionine) and the sum of any unknown Se species that were detected. The reference I linked to above notes that this procedure does leach some organically-bound selenium, and that is also our experience.
- An estimated cost for the above approach would be around \$350/sample with an 8-sample minimum charge per batch (i.e., a minimum charge of \$2,800). The minimum charge comes about because of the quality control that would be prepared and analyzed alongside the samples.
- In terms of quality control, we would include the following with each extraction batch:
  - 4 *method blanks* to demonstrate the absence of contamination for the target analytes
  - *Blanks spikes* prepared with the target selenium species (e.g., selenite and selenate) to demonstrate the ability of the method to recover those species in the absence of any sample matrix
  - At least one *matrix duplicate* to identify the precision of the method or heterogeneity issues with the samples
  - At least one *matrix spike set* (similar to the blank spikes, but spiked on top of one of the samples) to identify any potential biases induced by the sample matrices
- We would no longer recommend the enzymatic extraction approach, since it has *not* been applied extensively in the literature to these types of samples (suspended particulate, consisting of sediment and biogenic particles).

While a sequential extraction approach would be more comprehensive, we are unaware of any peer reviewed research performed on similar matrices (suspended lake particulate) that properly accounted for the varied forms of selenium that can exist. However, if you or the group you are collaborating with are aware of a potential selenium-specific sequential extraction procedure that you would be interested in performing, please feel free to forward us a copy; we can then review it and provide some comments as well as pricing for what setting that method up might cost. We are also open to participating in a conference call with your collaborators if you think that would be helpful.

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